What is claimed is:

1. A combustion chamber assembly for use in a diesel engine, comprising:

a combustion chamber having a lower portion and an upper portion and being defined in a crown of a piston, the combustion chamber lower portion having a center portion, the center portion being defined at least in part by a portion of a convex sphere, the sphere having a radius and an origin, the origin of the radius lying on a piston central axis and the combustion chamber further having an outwardly radially disposed bottom margin, the bottom margin being defined in part by a portion of an annulus, the annulus being concave and having an origin and a radius;

the combustion chamber upper portion having at least one step defining a flat surface disposed between the lower portion and the crown; and

the combustion chamber having smooth annular transitions between adjacent surfaces, the surfaces including the spherical center portion and the annular bottom margin.

2. The combustion chamber assembly of claim 1, the combustion chamber upper portion having a second step defining a flat surface disposed between the lower portion and the crown adjacent to the first step.

3. The combustion chamber assembly of claim 2, the combustion chamber upper portion having a third step defining a transition from the chamber lower portion to the second step.

4. The combustion chamber assembly of claim 1, including a piston incorporating the combustion chamber assembly.

5. The combustion chamber assembly of claim 2 wherein the flat surface is disposed substantially orthogonal with respect to a combustion chamber central axis.

6. The combustion chamber assembly of claim 3 wherein the flat surfaces are annular rings.

7. The combustion chamber assembly of claim 3 wherein the each of the steps effects a smooth transition between adjacent surfaces to the respective step.

8. The combustion chamber assembly of claim 3 wherein the each of the steps is an annular surface.

9. The combustion chamber assembly of claim 1 wherein the at least one step provides for reduced thermal stress in a piston incorporating the combustion chamber.

10. The combustion chamber assembly of claim 1 wherein the at least one step provides for reduced thermal stress by increasing a radial distance of a combustion chamber edge from a fuel injector tip.

11. The combustion chamber assembly of claim 1 wherein the ratio of SD1/D1 is greater than 0.86 and less than 0.98.

12. The combustion chamber assembly of claim 11 wherein the ratio of SD1/D1 is preferably 0.931.

13. The combustion chamber assembly of claim 1 wherein the ratio of SD2/D1 is greater than 0.55 and is less than 0.85.

14. The combustion chamber assembly of claim 13 wherein the ratio of SD2/D1 is preferably 0.695.

15. The combustion chamber assembly of claim 1 wherein the ratio of SD3/D1 is greater than 0.45 and is less than 0.75.

16. The combustion chamber assembly of claim 15 wherein the ratio of SD3/D1 is preferably 0.617.

17. The combustion chamber assembly of claim 1 wherein the ratio of D2/D1 is greater than 0.44 and is less than 0.74.

18. The combustion chamber assembly of claim 17 wherein the ratio of D2/D1 is preferably 0.603.

19. The combustion chamber assembly of claim 1 wherein the ratio of H1/D1 is greater than 0.18 and is less than 0.35.

20. The combustion chamber assembly of claim 19 wherein the ratio of H1/D1 is preferably 0.292.

21. The combustion chamber assembly of claim 1 wherein the ratio of SH2/D1 is greater than 0.025 and is less than 0.22.

22. The combustion chamber assembly of claim 21 wherein the ratio of SH2/D1 is preferably 0.034.

23. The combustion chamber assembly of claim 1 wherein the ratio of SH1/D1 is greater than 0.012 and is less than 0.11.

24. The combustion chamber assembly of claim 23 wherein the ratio of SH1/D1 is preferably 0.017.

25. The combustion chamber assembly of claim 1 wherein the ratio of H2/D1 is greater than 0.13 and is less than 0.33.

26. The combustion chamber assembly of claim 25 wherein the ratio of H2/D1 is preferably 0.178.

27. A piston having a combustion chamber assembly for use in a diesel engine, comprising:

a combustion chamber having a lower portion and an upper portion and being defined in a crown of a piston, the combustion chamber lower portion being formed of a plurality of spherical and annular surfaces having smooth annular transitions; and

the combustion chamber upper portion having at least one step defining a flat surface and defining a transition between the lower portion and the crown.

28. The piston of claim 27, the combustion chamber upper portion having a second step defining a flat surface disposed between the lower portion and the crown adjacent to the first step.

29. The piston of claim 28, the combustion chamber upper portion having a third step defining a transition from the chamber lower portion to the second step.

30. The piston of claim 27, including the piston incorporating the combustion chamber assembly.

31. The piston of claim 28 wherein the flat surface is disposed substantially orthogonal with respect to a combustion chamber axis.

32. The piston of claim 29 wherein the flat surfaces are annular rings.

33. The piston of claim 29 wherein the each of the steps effects a smooth transition between adjacent surfaces to the respective step.

34. The piston of claim 29 wherein the each of the steps is an annular surface.

35. The piston of claim 27 wherein the at least one step provides for reduced thermal stress in a piston incorporating the combustion chamber.

36. The piston of claim 27 wherein the at least one step provides for reduced thermal stress by increasing a radial distance of a combustion chamber edge from a fuel injector tip.

37. The piston of claim 27 wherein the ratio of SD1/D1 is greater than 0.86 and less than 0.98.

38. The piston of claim 37 wherein the ratio of SD1/D1 is preferably 0.931.

39. The piston of claim 27 wherein the ratio of SD2/D1 is greater than 0.55 and is less than 0.85.

40. The piston of claim 39 wherein the ratio of SD2/D1 is preferably 0.695.

41. The piston of claim 27 wherein the ratio of SD3/D1 is greater than 0.45 and is less than 0.75.

42. The piston of claim 41 wherein the ratio of SD3/D1 is preferably 0.617.

43. The piston of claim 27 wherein the ratio of D2/D1 is greater than 0.44 and is less than 0.74.

44. The piston of claim 43 wherein the ratio of D2/D1 is preferably 0.603.

45. The piston of claim 27 wherein he ratio of H1/D1 is greater than 0.18 and is less than 0.35.

46. The piston of claim 45 wherein he ratio of H1/D1 is preferably 0.292.

47. The piston of claim 27 wherein the ratio of SH2/D1 is greater than 0.025 and is less than 0.22.

48. The piston of claim 47 wherein the ratio of SH2/D1 is preferably 0.034.

49. The piston of claim 27 wherein the ratio of SH1/D1 is greater than 0.012 and is less than 0.11.

50. The piston of claim 49 wherein the ratio of SH1/D1 is preferably 0.017.

51. The piston of claim 27 wherein the ratio of H2/D1 is greater than 0.13 and is less than 0.33.

52. The piston of claim 51 wherein the ratio of H2/D1 is preferably 0.178.

53. A method of forming a combustion chamber for use in a diesel engine, comprising:

defining a combustion chamber in a crown of a piston, the piston having a central axis, defining the combustion chamber by the steps of:

defining a combustion chamber lower portion and an upper portion, forming the combustion chamber lower portion of a plurality of spherical and annular surfaces having smooth annular transitions; and

defining a transition between the lower portion and the crown by forming the combustion chamber upper portion with at least one step defining a flat surface.

54. The method of claim 53, including forming a second step defining a flat surface disposed between the lower portion and the crown adjacent to the first step.

55. The method of claim 54, including forming a third step defining a transition from the chamber lower portion to the second step.

56. The method of claim 55, including disposing the flat surface substantially orthogonal with respect to a combustion chamber central axis.

57. The method of claim 55, including forming the flat surfaces as annular rings.

58. The method of claim 55, including each of the steps effecting a smooth transition between adjacent surfaces to the respective step.

59. The method of claim 55, including forming the steps as an annular surface.